New research shows Earth's tilt influences climate change

December 14 2015

A composite image of the Western hemisphere of the Earth. Credit: NASA

Louisiana State University paleoclimatologist Kristine DeLong contributed to an international research breakthrough that sheds new light on how the tilt of the Earth affects the world's heaviest rainbelt. DeLong analyzed data from the past 282,000 years that shows, for the first time, a connection between the Earth's tilt called obliquity that shifts every 41,000 years, and the movement of a low pressure band of clouds that is the Earth's largest source of heat and moisture—the Intertropical Convergence Zone, or ITCZ.

"I took the data and put it through a mathematical prism so I could look at the patterns and that's where we see the obliquity cycle, that 41,000-year cycle. From that, we can go in and look at how it compares to other records," said DeLong, who is an associate professor in the LSU Department Geography & Anthropology.

With research collaborators at the University of Science and Technology of China and National Taiwan University, DeLong looked at sediment cores from off the coast of Papua New Guinea and stalagtite samples from ancient caves in China. DeLong's data analysis revealed obliquity in both the paleontological record and computer model data. This research was published in *Nature Communications* on Nov. 25.

The standard assumptions about how the variations in the Earth's orbit influences changes in climate are called Milankovitch cycles. According to these principles, the Earth's tilt influenced ice sheet formation during the Ice Ages, the slow wobble that occurs on a 23,000-year cycle as the Earth rotates around the sun called precession affects the Tropics and the shape of the Earth's orbit that occurs on a 100,000-year cycle controls how much energy the Earth receives.

"This study was interesting in that when we started doing the spectral analysis, the 41,000-year tilt cycle started showing up in the Tropics. That's not supposed to be there. That's not what the textbooks tell us,"

DeLong said.

This finding shows that the tilt of the Earth plays a much larger part in ITCZ migration than previously thought, which will enable climate scientists to better predict extreme weather events. Historically, the collapse of the Mayan civilization and several Chinese dynasties have been linked to persistent droughts associated with the ITCZ. This new information is critical to understanding global climate and sustainable human socioeconomic development, the researchers said.

Additionally, climate scientists have begun to recognize that rather than shifting north and south, the ITCZ expands and contracts, based on this information.

More information: Yi Liu et al. Obliquity pacing of the western Pacific Intertropical Convergence Zone over the past 282,000 years, *Nature Communications* (2015). DOI: 10.1038/ncomms10018

Provided by Louisiana State University

Citation: New research shows Earth's tilt influences climate change (2015, December 14) retrieved 21 September 2024 from https://phys.org/news/2015-12-earth-tilt-climate.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.